

GSFC global mascon solution L3 HDF5 format summary

When using this data please reference the paper: Luthcke, S. B., T. J. Sabaka, B. D. Loomis, et al. 2013. "Antarctica, Greenland and Gulf of Alaska land ice evolution from an iterated GRACE global mascon solution." *J. Glac.* 59 (216), 613-631.

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Group: /size

This group contains variables that describe the dimensions of the variables in subsequent groups.

Dataset	Description	Sample value
N_arcs	Number of one-day arcs of L1B data contained in the full set of mascon solutions	3609
N_mascon_times	Number of solution times in data product	127
N_mascons	Number of global mascons	41168

Group: /time

This group contains the full list of GRACE L1B dates used in the solution and the beginning, middle, and end of each mascon solution time window.

Dataset	Description	Size	Sample value
list_ref_days_solution	The full list of days of GRACE L1B data used in the full set of mascon solutions (days since Jan 0, 2002)	N_arcs x 1	4504
n_ref_days_solution	The number of days of GRACE L1B data used in the mascon solution for this time window	N_mascon_times x 1	30
n_ref_days_window	The number of days in the mascon solution time window (greater or equal to n_ref_days_solution)	N_mascon_times x 1	31
ref_days_first	The first day in the mascon solution time window (days since Jan 0, 2002)	N_mascon_times x 1	4504
ref_days_last	The last day in the mascon solution time window (days since Jan 0, 2002)	N_mascon_times x 1	4534
ref_days_middle	The middle day of the mascon solution time (days since Jan 0, 2002)	N_mascon_times x 1	4519
yyyy_doy_yrplot_middle	Four digit year, day of year, and year plus fractional year for the middle of the mascon solution time window	N_mascon_times x 3	2014 136 2014.369863

Group: /mascon

This group contains the parameters that fully describe the spatial characteristics of the global mascons.

Dataset	Description	Size	Description / Sample value
area_deg	Area of each global mascon in square degrees at the equator	N_mascons x 1	1.011449
area_km2	Area of each global mascon in km ²	N_mascons x 1	12453.61
lat_center	Center latitude of mascon (degrees)	N_mascons x 1	78
lat_span	Size of mascon in latitude (degrees)	N_mascons x 1	1
lon_center	Center longitude of mascon (degrees)	N_mascons x 1	289.4594595
lon_span	Size of mascon in longitude (degrees)	N_mascons x 1	4.8648649
location	Numerical identifier for each region	N_mascons x 1	1, 3, 4, 5, 80, 90 (see table below)
basin	Numerical identifier for basin within the region	N_mascons x 1	(see table below)
elev_flag	Numerical identifier for GIS region	N_mascons x 1	0 = > 2000 m 1 = < 2000 m

Regional information contained in /mascon datasets:

Region	Indices	/location	/basin
Greenland Ice Sheet	00001:00199	1	1.1, 1.2, 1.3, 1.4, 2.1, 2.2, 3.1, 3.2, 3.3, 4.1, 4.2, 4.3, 5.0, 6.1, 6.2, 7.1, 7.2, 8.1, 8.2
Antarctic Ice Sheet	00200:01326	3	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36
Gulf of Alaska	01327:01387	5	N/A
Ice Shelves	01388:01472	4	0 = Small ice shelves, 1 = Ross Ice Shelf, 2 = Ronne Ice Shelf
Land	01473:13608	80	1nnn = North America 2nnn = Mexico & Central America 3nnn = South America 4nnn = Europe 5nnn = Asia 6nnn = Middle East 7nnn = Africa 8nnn = Oceania
Ocean	13609:41168	90	0 = Ocean 1 = Mediterranean Sea 2 = Black Sea 3 = Red Sea 4 = Caspian Sea 5 = Hudson Bay

Constraints regions are: 1.) GIS elevation below 2000 m; 2.) GIS elevation above 2000 m; 3.) Antarctic ice sheet and Ronne and Ross ice shelves; 4.) Gulf of Alaska; 5.) Land including glaciers; 6.) Ocean including other ice shelves and large seas.

Basin definitions for Greenland Ice Sheet and Antarctic Ice Sheet are from:

Zwally, H. Jay, Mario B. Giovinetto, Matthew A. Beckley, and Jack L. Saba, 2012, Antarctic and Greenland Drainage Systems, GSFC Cryospheric Sciences Laboratory, at http://icesat4.gsfc.nasa.gov/cryo_data/ant_grn_drainage_systems.php

Group: /solution

This group contains the time series of solutions for each mascon. The filtering procedure is described in: Loomis, B. D., and Luthcke, S. B., "Optimized signal denoising and adaptive estimation of seasonal timing and mass balance from simulated GRACE-like regional mass variations," *Adv. Adapt. Data Anal.* 06, 1450003 (2014) DOI: 10.1142/S1793536914500034.

Dataset	Description	Size
cmwe	Solutions for each mascon location and time (cm equivalent water height)	N_mascon_times x N_mascons

Reading HDF5 datasets in MATLAB:

```
% Sample MATLAB code to read time array and filtered mascon solutions
time.ref_days_middle = h5read(h5filename,'/time/ref_days_middle');
solution.cmwe = h5read(h5filename,'/solution/cmwe');
```